REMARKS

Claims 1-9 have been amended. New claim 10 has been added. Reexamination and reconsideration are respectfully requested.

In the Office Action, claims 1-9 were rejected as being obvious over MITANI et al. (US 5,544,529) in view of BARTH (US 4,655,610). In view of the following remarks, Applicants respectfully traverse this rejection.

Applicants' invention is directed toward a pressure sensor that can be easily manufactured and provide improved durability. As recited in claim 1, a semiconductor pressure sensor includes a substrate (for example substrate 1 shown in Figure 1) on which is arranged a diaphragm formed by a sacrificial layer etching method (for example diaphragm 6 shown in Figure 1). A silicon oxide film (for example 9) seals an etchant filling hole (for example 12 shown in Figure 2) of a sacrificial layer on the diaphragm (6). Importantly, a polysilicon film (for example 10) is provided to cover part or all of the silicon oxide film (9). The use of a silicon oxide film together with a polysilicon film is described in Applicants' specification on page 8, line 11 through page 9, line 18. Applicants' invention thus provides a sealing structure for the etch channel that is highly resistant to moisture and temporal change of the diaphragm in the pressure sensor, while providing a pressure sensor characterized by excellent productivity and durability (page 4, lines 8-14).

As discussed in Applicants' background section, known prior art sensors formed by sacrificial layer etching (as shown for example in Figure 23) did not provide any polysilicon film covering part or all of the silicon oxide film (for example 8 in Figure 23). Hence, the long term use of the pressure sensor could

not be reliably ensured as, for example, in a highly humid environment, moisture could enter the gap 7 through the silicon oxide film 8, thus causing a change in the sensor characteristics. Applicants' invention solves these problems by providing a polysilicon film which covers part or all of the silicon oxide film.

Regarding the cited references, the MITANI et al. reference is not at all related to the present invention. MITANI merely discloses a pressure sensor circuit without providing any substantial detail on the semiconductor structure of the pressure sensor. BARTH, on the other hand, merely discloses a semiconductor pressure transducer utilizing silicon oxide and polysilicon. However, other than the use of the same materials, BARTH provides no teaching, suggestion or disclosure for utilizing such materials in a semiconductor pressure sensor as recited in Applicants' claim 1. Hence, one skilled in the art gains nothing from BARTH that would lead to Applicants' invention. In fact, as discussed in BARTH at col. 6, lines 48-53, BARTH describes sealing a cavity using only silicon oxide 54 as shown in Figure 19. Hence, at best, BARTH would lead one of skill in the art to seal a diaphragm using only silicon oxide as was done in the prior art and described in Applicants' background of the invention.

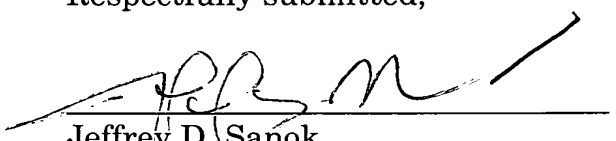
In view of the above, Applicants submit independent claim 1 is patentable over MITANI in view of BARTH. Further, claims 2-4 depend from claim 1 and are also submitted to be patentable. In that regard, it should be pointed out that the specific dimensional characteristics of Applicants' pressure sensor are not taught or suggested by either MITANI or BARTH.

Similarly, Applicants' independent claim 5 recites a pressure detector in which the detector includes as an integral unit the silicon oxide film that is

please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #381NP/50378).

Respectfully submitted,

December 31, 2002



Jeffrey D. Sanok
Registration No. 32,169

CROWELL & MORING, LLP
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844

JDS:pct
CAM #056207.50378US

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend claims 1-9 as follows:

1. (Amended) A semiconductor pressure sensor, comprising[;]:

a substrate,

a diaphragm formed on said substrate by a sacrificial layer etching method, and

a silicon oxide film [provided by] for sealing [the] an etchant filling hole of [the] a sacrificial layer on [the] said diaphragm;

said semiconductor pressure sensor characterized in that a polysilicon film is provided to cover part or [whole] all of said silicon oxide film.

2. (Amended) A semiconductor pressure sensor according to Claim 1, characterized in that [the] a distance of said covered part is at least 10 microns or less from said etchant filling hole.

3. (Amended) A semiconductor pressure sensor according to Claim 1, characterized in that [the] a thickness of said polysilicon film is 0.1 microns or more.

4. (Amended) A semiconductor pressure sensor according to Claim 1, characterized in that [the] a thickness of said polysilicon film is 0.1 microns [and over] or more up to and including 0.4 microns.

5. (Amended) A pressure detector, comprising[;]:

(a) a detector [further comprising] providing an output, the detector including as an integral unit;

a substrate,

a diaphragm formed on said substrate by a sacrificial layer etching method,

a silicon oxide film [provided by] for sealing [the] an etchant filling hole of [the] a sacrificial layer on [the] said diaphragm, and

a polysilicon film covering part or [whole] all of said silicon oxide film;

(b) a correction circuit for correction of the output of said detector;

[(d)] (c) a package enclosing said correction circuit and said detector; and

(d) an intake tube provided in said package, the intake tube being [and] used for [introduction of] introducing external pressure to said detector.

6. (Amended) A pressure detector according to Claim 5, characterized in that [(h) the] a distance (h) of said [covered] covering part is at least 10 microns or less from said etchant filling hole.

7. (Amended) A pressure detector according to Claim 5, characterized in that [(i) the] a thickness (i) of said polysilicon film is 0.1 microns or more.

8. (Amended) A pressure detector according to Claim 5, characterized in that [(j) the] a thickness (j) of said polysilicon film is 0.1 microns [and over] or more up to and including 0.4 microns.

9. (Amended) A pressure detector according to Claim 5 comprising[;]:

(e) a sub-package further comprising said correction circuit and said detector as an integral unit, and having on [the] a surface a pad connected to said correction circuit, and

(f) an output terminal removably connected to [the] an external signal line and being used to send a signal from said correction circuit to the external signal line;

said pressure detector further characterized in that

(g) said correction circuit and said detector are enclosed by said package after said pad and said output terminal are connected by a metal wire.